CHAPTER 4

VII-MATHEMATICS-NCERT

4 .Simple Equations (Notes)

PREPARED BY: BALABHADRA SURESH
https://sureshmathsmaterial.com/

1. **Variable**: A variable takes on different numerical values; its value is not fixed. Variables are denoted usually by letters of the alphabets, such as x, y, z, l, m, n, p, etc
2. **Expression**: The expressions are formed by performing operations like addition, subtraction, multiplication and division on the variables.

   Ex: $4x + 5, 3y - 10, -2z - 6, \ldots$

Try These

The value of the expression (10y – 20) depends on the value of y. Verify this by giving five different values to y and finding for each y the value of (10 y – 20). From the different values of (10y – 20) you obtain, do you see a solution to 10y – 20 = 50? If there is no solution, try giving more values to y and find whether the condition 10y – 20 = 50 is met.

Sol:

Value of y	Value of 10y-20
$y = 0$	$10 \times 0 - 20 = 0 - 20 = -20$
$y = 1$	$10 \times 1 - 20 = 10 - 20 = -10$
$y = 2$	$10 \times 2 - 20 = 20 - 20 = 0$
$y = 3$	$10 \times 3 - 20 = 30 - 20 = 10$
$y = 4$	$10 \times 4 - 20 = 40 - 20 = 20$
$y = 5$	$10 \times 5 - 20 = 50 - 20 = 30$
$y = 6$	$10 \times 6 - 20 = 60 - 20 = 40$
$y = 7$	$10 \times 7 - 20 = 70 - 20 = 50$

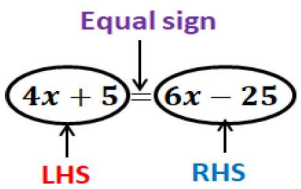
When we take y = 7, the condition 10y - 20 = 50 is met.

Equation

- In an equation there is always an equality sign.
- An equation is a condition on a variable. The condition is that two expressions should have equal value. Note that at least one of the two expressions must contain the variable
- The expression to the left of the equal sign is **LHS** and the left of the equal sign is **RHS**.
- An equation remains the same, when the expressions on the left and on the right are interchanged

Ex: In equation : $\mathbf{4x + 5 = 6x - 25}$

LHS $= 4x + 5$ and RHS $= 6x - 25$



Example 1: Write the following statements in the form of equations:

(i) The sum of three times x and 11 is 32.

Sol: $3x + 11 = 32$

(ii) If you subtract 5 from 6 times a number, you get 7.

Sol: Let the number=z

The equation is $6z - 5 = 7$

(iii) One fourth of m is 3 more than 7.

Sol: $\frac{m}{4} - 7 = 3$

(iv) One third of a number plus 5 is 8.

Sol: Let the number=n

The equation is $\frac{n}{3} + 5 = 8$

Example2: Convert the following equations in statement form:

(i) $x - 5 = 9$

Sol: Taking away 5 from x gives 9

(ii) $5p = 20$

Sol: Five times a number p is 20.

(iii) $3n + 7 = 1$

Sol: Add 7 to three times n to get 1.

(iv) $\frac{m}{5} - 2 = 6$

Sol: You get 6, when you subtract 2 from one-fifth of a number m

Example 3 :Consider the following situation: Raju's father's age is 5 years more than three times Raju's age. Raju's father is 44 years old. Set up an equation to find Raju's age.

Sol: Let Raju's age=y years.

Raju's father's age= $(3y + 5) years$

From problem Raju's fathers age= 44 years

$\therefore$ Required equation : $3y + 5 = 44$

Example 4: A shopkeeper sells mangoes in two types of boxes, one small and one large. A large box contains as many as 8 small boxes plus 4 loose mangoes. Set up an equation which gives the number of mangoes in each small box. The number of mangoes in a large box is given to be 100.

Sol: Let number of mangoes in small box=m

Number of mangoes in large box=$8m + 4$

Given the number of mangoes in large box=100

$\therefore$ Required equation: $8m + 4 = 100$

EXERCISE 4.1

1. Complete the last column of the table.

S. No	Equation	Value	Say, whether the Equation is Satisfied. (Yes/ No)	
(i)	$x + 3 = 0$	$x = 3$	LHS = x + 3 = 3 + 3 = 6 ≠ RHS	No
(ii)	$x + 3 = 0$	$x = 0$	LHS = x + 3 = 0 + 3 = 3 ≠ RHS	No
(iii)	$x + 3 = 0$	$x = -3$	LHS = x + 3 = −3 + 3 = 0 = RHS	Yes
(iv)	$x - 7 = 1$	$x = 7$	LHS = x − 7 = 7 − 7 = 0 ≠ RHS	No
(v)	$x - 7 = 1$	$x = 8$	LHS = x − 7 = 8 − 7 = 1 = RHS	Yes
(vi)	$5x = 25$	$x = 0$	LHS = $5x = 5 \times 0 = 0 \neq$ RHS	No
(vii)	$5x = 25$	$x = 5$	LHS = $5x = 5 \times 5 = 25 =$ RHS	Yes
(viii)	$5x = 25$	$x = -5$	LHS = $5x = 5 \times (-5) = -25 \neq$ RHS	No
(ix)	$\frac{m}{3} = 2$	$m = -6$	LHS = $\frac{m}{3} = \frac{-6}{3} = -2 \neq$ RHS	No
(x)	$\frac{m}{3} = 2$	$m = 0$	LHS = $\frac{m}{3} = \frac{0}{3} = 0 \neq$ RHS	No
(xi)	$\frac{m}{3} = 2$	$m = 6$	LHS = $\frac{m}{3} = \frac{6}{3} = 2 =$ RHS	Yes

2. Check whether the value given in the brackets is a solution to the given equation or not:

$(a)\ n + 5 = 19\ (n = 1)$

Sol: LHS = $n + 5 = 1 + 5 = 6$

RHS = 19

LHS ≠ RHS.

$So, n = 1$ *is not a solution of* $n + 5 = 19$

(b) $7n + 5 = 19$ $(n = -2)$

Sol: LHS $= 7n + 5 = 7 \times (-2) + 5 = -14 + 5 = -9$

RHS $= 19$

LHS $\neq$ RHS.

$So, n = -2$ *is not a solution of* $7n + 5 = 19$

(c) $7n + 5 = 19$ $(n = 2)$

Sol: LHS $= 7n + 5 = 7 \times (2) + 5 = 14 + 5 = 19$

RHS $= 19$

LHS $=$ RHS.

So, $n = 2$ is a solution of $7n + 5 = 19$

(d) $4p - 3 = 13$ $(p = 1)$

Sol: LHS $= 4p - 3 = 4 \times 1 + 5 = 4 + 5 = 9$

RHS $= 13$

LHS $\neq$ RHS.

So, $p = 1$ is not a solution of $4p - 3 = 13$

(e) $4p - 3 = 13$ $(p = -4)$

Sol: LHS $= 4p - 3 = 4 \times (-4) - 3 = -16 - 3 = -19$

RHS $= 13$

LHS $\neq$ RHS.

So, $p = -4$ is not a solution of $4p - 3 = 13$

(f) $4p - 3 = 13$ $(p = 0)$

Sol: LHS $= 4p - 3 = 4 \times 0 - 3 = 0 - 3 = -3$

RHS $= 13$

LHS $\neq$ RHS.

$So, p = 0$ is not a solution of $4p - 3 = 13$

3. Solve the following equations by trial and error method:

(i) $5p + 2 = 17$

'p' value	*LHS* $= 5p + 2$	RHS=17	Is LHS=RHS
0	$5p + 2 = 5 \times 0 + 2 = 0 + 2 = 2$	17	No
1	$5p + 2 = 5 \times 1 + 2 = 5 + 2 = 7$	17	No
2	$5p + 2 = 5 \times 2 + 2 = 10 + 2 = 12$	17	No
3	$5p + 2 = 5 \times 3 + 2 = 15 + 2 = 17$	17	Yes

For p = 3, LHS = RHS.

So, p = 3 is the solution of the equation $5p + 2 = 17$.

$(ii) 3m - 14 = 4$

$'m'value.$	LHS $= 3m - 14$	RHS=4	Is LHS=RHS
2	$3m - 14 = 3 \times 2 - 14 = 6 - 14 = -8$	4	No
3	$3m - 14 = 3 \times 3 - 14 = 9 - 14 = -5$	4	No
4	$3m - 14 = 3 \times 4 - 14 = 12 - 14 = -2$	4	No
5	$3m - 14 = 3 \times 5 - 14 = 15 - 14 = 1$	4	No
6	$3m - 14 = 3 \times 6 - 14 = 18 - 14 = 4$	4	Yes

For m=6, LHS=RHS.

So, m=6 is the solution of the equation $3m - 14 = 4$

4. Write equations for the following statements:

(i) The sum of numbers x and 4 is 9.

Sol: $x + 4 = 9$

(ii) 2 subtracted from y is 8.

Sol: $y - 2 = 8$

(iii) Ten times a is 70.

Sol: $10a = 70$

(iv) The number b divided by 5 gives 6.

Sol: $\frac{b}{5} = 6$

(v) Three-fourth of t is 15.

Sol: $\frac{3}{4}t = 15$ *or* $\frac{3t}{4} = 15$

(vi) Seven times m plus 7 gets you 77.

Sol: $7m + 7 = 77$

(vii) One-fourth of a number x minus 4 gives 4.

Sol: $\frac{1}{4}x - 4 = 4$ *or* $\frac{x}{4} - 4 = 4$

(viii) If you take away 6 from 6 times y, you get 60.

Sol: $6y - 6 = 60$

(ix) If you add 3 to one-third of z, you get 30.

Sol: $\frac{1}{3}z + 3 = 30$ *or* $\frac{z}{3} + 3 = 30$

Write the following equations in statement forms:

(i) p + 4 = 15

Sol: The sum of p and 4 is 15.

(ii) m - 7 = 3

Sol: 7subtracted from m is 3.

(iii) $2m = 7$

Sol: Twice of a number m is 7.

(iv) $\frac{m}{5} = 3$

Sol: One – fifth of a number m is 3.

(v) $\frac{3m}{5} = 6$

Sol: Three – fifth of a number m *is* 6.

(vi) $3p + 4 = 25$

Sol: Three times of a number p when added to 4 gives 25

(vii) $4p - 2 = 18$

Sol: 2 subtracted from four times a number p is 18.

(viii) $\frac{p}{2} + 2 = 8$

Sol: Add 2 to half of a number p to get 8.

Set up an equation in the following cases:

(i) Irfan says that he has 7 marbles more than five times the marbles Parmit has. Irfan has 37 marbles. (Take m to be the number of Parmit's marbles.)

Sol: Let number of marbles Parmit has $= m$

Number of marbles Irfan has $= 5m + 7$

But Ifran has 37 marbles

Required equation: $5m + 7 = 37$

(ii) Laxmi's father is 49 years old. He is 4 years older than three times Laxmi's age. (Take Laxmi's age to be y years.)

Sol: Let Lakshmi's age $= y$ years

Lakshmi's father age $= 3y + 4$

But Lakshmi's father age=49 years

Required equation: $3y + 4 = 49$

(iii) The teacher tells the class that the highest marks obtained by a student in her class is twice the lowest marks plus 7. The highest score is 87. (Take the lowest score to be l.)

Sol: Let the lowest score $= l$

The highest score $= 2l + 7$

But the highest score=87

Required equation: $2l + 7 = 87$

(iv) In an isosceles triangle, the vertex angle is twice either base angle. (Let the base angle be b in degrees. Remember that the sum of angles of a triangle is 180 degrees).

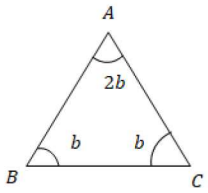
Sol: Let base angle of the triangle $= b$ degrees.

The vertex angle $= 2b$

The sum of angles of a triangle is 180 degrees

$b + b + 2b = 180^0$

Required equation: $4b = 180^0$



Solving an Equation

1. If we **add** or **subtract** the same number from both sides of an equation, it still holds.
2. If we **multiply** or **divide** both sides of the equation by the same non-zero number, it still holds.
3. If we fail to do the same mathematical operation with same number on both sides of an equation, the equality may not hold.

Example 5: **Solve $3n + 7 = 25$**

Sol: Given equation $3n + 7 = 25$

Subtracting 7 from both sides

$3n + 7 - 7 = 25 - 7$

$3n = 18$

Divide both sides by 3,

$\frac{3n}{3} = \frac{18}{3}$

$n = 6$

$n = 6$ *is the solution of the equation* $3n + 7 = 25$

(b) Solve $2p - 1 = 23$

Sol: Given equation : $2p - 1 = 23$

Add 1 to both the sides.

$2p - 1 + 1 = 23 + 1$

$2p = 22$

Divide both sides by 2,

$\frac{2p}{2} = \frac{22}{2}$

$p = 11$

$p = 11$ is the solution of the equation $2p - 1 = 23$.

EXERCISE 4.2

1. Give first the step you will use to separate the variable and then solve the equation:

(a) $x - 1 = 0$

Sol: $x - 1 = 0$

Add '1' on both sides.

$x - 1 + 1 = 0 + 1$

$x = 1$

Solution : $x = 1$

(b) $x + 1 = 0$

Sol: $x + 1 = 0$

Subtract '1' on both sides.

$x + 1 - 1 = 0 - 1$

$x = -1$

Solution : $x = -1$

(c) $x - 1 = 5$

Sol: $x - 1 = 5$

Add '1' on both sides.

$x - 1 + 1 = 5 + 1$

$x = 6$

Solution : $x = 6$

(d) $x + 6 = 2$

Sol: $x + 6 = 2$

Subtract '6' from both sides.

$x + 6 - 6 = 2 - 6$

$x = -4$

(e) $y - 4 = -7$

Sol: $y - 4 = -7$

Add '4' on both sides

$y - 4 + 4 = -7 + 4$

$y = -3$

(f) $y - 4 = 4$

Sol: $y - 4 = 4$

Add '4' on both sides

$y - 4 + 4 = 4 + 4$

$y = 8$

(g) $y + 4 = 4$

Sol: $y + 4 = 4$

Subtract '4' from both sides.

$y + 4 - 4 = 4 - 4$

$y = 0$

(h) $y + 4 = -4$

Sol: $y + 4 = -4$

Subtract '4' from both sides.

$y + 4 - 4 = -4 - 4$

$y = -8$

2. Give first the step you will use to separate the variable and then solve the equation:

(a) $3l = 42$

Sol: $3l = 42$

Divide both sides by '3'.

$\frac{3l}{3} = \frac{42}{3}$

$l = 14$

(b) $\frac{b}{2} = 6$

Sol: $\frac{b}{2} = 6$

Multiply both sides with '2'.

$\frac{b}{2} \times 2 = 6 \times 2$

$b = 12$

(c) $\frac{p}{7} = 4$

Sol: $\frac{p}{7} = 4$

Multiply both sides with '7'

$\frac{p}{7} \times 7 = 4 \times 7$

$p = 28$

(d) $4x = 25$

Sol: $4x = 25$

Divide both sides by '4'

$\frac{4x}{4} = \frac{25}{4}$

$x = \frac{25}{4}$

(e) $8y = 36$

Sol: $8y = 36$

Divide both sides by '8'

$\frac{8y}{8} = \frac{36}{8}$

$y = \frac{9}{2}$

(f) $\frac{z}{3} = \frac{5}{4}$

Sol: $\frac{z}{3} = \frac{5}{4}$

Multiply both sides with '3'

$\frac{z}{3} \times 3 = \frac{5}{4} \times 3$

$z = \frac{15}{4}$

(g) $\frac{a}{5} = \frac{7}{15}$

Sol: $\frac{a}{5} = \frac{7}{15}$

Multiply both sides with '5'

$\frac{a}{5} \times 5 = \frac{7}{15} \times 5$

$a = \frac{7}{3}$

(h) $20t = -10$

Sol: $20t = -10$

Divide both sides by '20'

$\frac{20t}{20} = \frac{-10}{20}$

$t = -\frac{1}{2}$

3. Give the steps you will use to separate the variable and then solve the equation:

(a) $3n - 2 = 46$

Sol: $3n - 2 = 46$

Add '2' on both sides.

$3n - 2 + 2 = 46 + 2$

$3n = 48$

Divide both sides by '3'

$\frac{3n}{3} = \frac{48}{3}$

$n = 16$

(b) $5m + 7 = 17$

Sol: $5m + 7 = 17$

Subtract '7' from both sides.

$5m + 7 - 7 = 17 - 7$

$5m = 10$

Divide both sides by '5'

$\frac{5m}{5} = \frac{10}{5}$

$m = 2$

(c) $\frac{20p}{3} = 40$

Sol: $\frac{20p}{3} = 40$

Multiply both sides with '3'

$\frac{20p}{3} \times 3 = 40 \times 3$

$20p = 120$

Divide both sides by '20'

$\frac{20p}{20} = \frac{120}{20}$

$p = 6$

(d) $\frac{3p}{10} = 6$

Sol: $\frac{3p}{10} = 6$

Multiply both sides with '10'

$\frac{3p}{10} \times 10 = 6 \times 10$

$3p = 60$

Divide both sides by '3'

$\frac{3p}{3} = \frac{60}{3}$

$p = 20$

4. Solve the following equations:

(a) $10p = 100$

Sol: $10p = 100$

Divide both sides by '10'

$\frac{10p}{10} = \frac{100}{10}$

$p = 10$

(b) $10p + 10 = 100$

Sol: $10p + 10 = 100$

Subtract '10' from both sides.

$10p + 10 - 10 = 100 - 10$

$10p = 90$

Divide both sides by '10'

$\frac{10p}{10} = \frac{90}{10}$

$p = 9$

(c) $\frac{p}{4} = 5$

Sol: $\frac{p}{4} = 5$

Multiply both sides with '4'.

$\frac{p}{4} \times 4 = 5 \times 4$

$p = 20$

(d) $\frac{-p}{3} = 5$

Sol: $\frac{-p}{3} = 5$

Multiplied both sides with '-3'

$\frac{-p}{3} \times (-3) = 5 \times (-3)$

$P = -15$

(e) $\frac{3p}{4} = 6$

Sol: $\frac{3p}{4} = 6$

Multiply both sides with '4'

$\frac{3p}{4} \times 4 = 6 \times 4$

$3p = 24$

Divide both sides by '3'

$\frac{3p}{3} = \frac{24}{3}$

$p = 8$

(f) $3s = -9$

Sol: $3s = -9$

Divide both sides by '3'

$\frac{3s}{3} = \frac{-9}{3}$

$s = -3$

(g) $3s + 12 = 0$

Sol: $3s + 12 = 0$

Subtract '12' from both sides.

$3s + 12 - 12 = 0 - 12$

$3s = -12$

Divide both sides by '3'

$\frac{3s}{3} = \frac{-12}{3}$

$s = -4$

(h) $3s = 0$

Sol: $3s = 0$

Divide both sides by '3'

$\frac{3s}{3} = \frac{0}{3}$

$s = 0$

(i) $2q = 6$

Sol: $2q = 6$

Divide both sides by '2'

$\frac{2q}{2} = \frac{6}{3}$

$q = 2$

(j) $2q - 6 = 0$

Sol: $2q - 6 = 0$

Add '6' on both sides.

$2q - 6 + 6 = 0 + 6$

$2q = 6$

Divide both sides by '2'

$\frac{2q}{2} = \frac{6}{3}$

$q = 2$

(k) $2q + 6 = 0$

Sol: $2q + 6 = 0$

Subtract '6' from both sides.

$2q + 6 - 6 = 0 - 6$

$2q = -6$

Divide both sides by '2'

$\frac{2q}{2} = \frac{-6}{3}$

$q = -2$

(l) $2q + 6 = 12$

Subtract '6' from both sides.

$2q + 6 - 6 = 12 - 6$

$2q = 6$

Divide both sides by '2'

$\frac{2q}{2} = \frac{6}{3}$

$q = 2$

Method of transposition:

Transposing a number (i.e., changing the side of the number) is the same as adding or subtracting multiply or dividing the number from both sides

Thus, in transposing terms from LHS to RHS or RHS to LHS

'+ quantity' becomes '– quantity'	'– quantity' becomes '+ quantity'
'× quantity' becomes '÷ quantity'	'÷ quantity' becomes '× quantity'

Exp 6 :Solve: $12p - 5 = 25$.

Sol: Given equation: $12p - 5 = 25$.

$12p = 25 + 5$ (transposing -5 *to RHS*)

$12p = 30$

$\frac{12p}{12} = \frac{30}{12}$ (Dicvide both sides by 12)

$p = \frac{5}{2}$

Check: Putting $p = \frac{5}{2}$

$LHS = 12p - 5 = 12 \times \frac{5}{2} - 5$

$= 6 \times 5 - 5$

$= 30 - 5$

$= 25 = RHS$

Example 7: *Solve* $(a) 4(m + 3) = 18$

Sol: $4(m + 3) = 18$

Divide both sides by '4'.

$\frac{4(m+3)}{4} = \frac{18}{4}$

$m + 3 = \frac{9}{2}$

$m = \frac{9}{2} - 3$ (transposing 3 to RHS)

$m = \frac{9-6}{2} = \frac{3}{2}$

Check: *Put* $m = \frac{3}{2}$

LHS $= 4(m + 3) =$

$4\left(\frac{3}{2} + 3\right) = 4\left(\frac{3+6}{2}\right)$

$= 4 \times \frac{9}{2} = 2 \times 9$

$= 18 =$ RHS

(b)– $2(x + 3) = 8$

Sol: $-\ 2(x + 3) = 8$

Divide both sides by '-2'.

$\frac{-\ 2 \times (x + 3)}{-2} = \frac{8}{-2}$

$x + 3 = -4$

$x = -4 - 3$ (transposing 3 to RHS)

$x = -7$

Check: *Put* $x = -7$

LHS $=-\ 2(x + 3)$

$=-\ 2(-7 + 3)$

$= -2 \times (-4)$

$= 8$

$=$ RHS

Exmple 8:The sum of three times a number and 11 is 32. Find the number.

Sol: Let the number $= x$

From problem: $3x + 11 = 32$

$3x = 32 - 11$(transposing 11 to RHS)

$3x = 21$

Divide both sides by '3'

$\frac{3x}{3} = \frac{21}{3}$

$x = 7$

The required number is 7.

Example 9: Find a number, such that one-fourth of the number is 3 more than 7.

Sol: Let the number $= y$

$\frac{y}{4} - 7 = 3$

$\frac{y}{4} = 3 + 7$

$\frac{y}{4} = 10$

$\frac{y}{4} \times 4 = 10 \times 4$

$y = 40$

The required number is 40.

Example 10 :Raju's father's age is 5 years more than three times Raju's age. Find Raju's age, if his father is 44 years old.

Sol: Let Raju's age $= x$ years

Raju's father's age $= (3x + 5)$ years.

Given Raju's father's age=44 years.

$3x + 5 = 44$

$3x = 44 - 5$

$3x = 39$

$\frac{3x}{3} = \frac{39}{3}$

$x = 13$

Raju's age=13 years.

TRY THESE

There are two types of boxes containing mangoes. Each box of the larger type contains 4 more mangoes than the number of mangoes contained in 8 boxes of the smaller type. Each larger box contains 100 mangoes. Find the number of mangoes contained in the smaller box?

Sol: Let the number of mangoes in smaller box=x

Number of mangoes in larger box $= 8x + 4$

But each larger box contains 100 mangoes.

$8x + 4 = 100$

$8x = 100 - 4$

$8x = 96$

$\frac{8x}{8} = \frac{96}{8}$

$x = 12$

$\therefore$ The number of mangoes in smaller box $= 12$.

EXERCISE 4.3

1. Set up equations and solve them to find the unknown numbers in the following cases:

(a) Add 4 to eight times a number; you get 60.

Sol: Let the number $= x$

$8x + 4 = 60$

$8x = 60 - 4$

$8x = 56$

$\frac{8x}{8} = \frac{56}{8}$

$x = 7$

(b) One-fifth of a number minus 4 gives 3.

Sol: Let the number $= y$

$\frac{y}{5} - 4 = 3$

$\frac{y}{5} = 3 + 4$

$\frac{y}{5} = 7$

$\frac{y}{5} \times 5 = 7 \times 5$

$y = 35$

(c) If I take three-fourths of a number and add 3 to it, I get 21.

Sol: Let the number $= n$

$\frac{3n}{4} + 3 = 21$

$\frac{3n}{4} = 21 - 3$

$$\frac{3n}{4} = 18$$

$$\frac{3n}{4} = 18$$

$$\frac{3n}{4} \times \frac{4}{3} = 18 \times \frac{4}{3}$$

$$n = 6 \times 4 = 24$$

(d) When I subtracted 11 from twice a number, the result was 15.

Sol: Let the number $= x$

$$2x - 11 = 15$$

$$2x = 15 + 11$$

$$2x = 26$$

$$\frac{2x}{2} = \frac{26}{2}$$

$$x = 13$$

(e) Munna subtracts thrice the number of notebooks he has from 50, he finds the result to be 8.

Sol: Let the number of note books $= y$

$$50 - 3y = 8$$

$$-3y = 8 - 50$$

$$-3y = -42$$

$$\frac{-3y}{-3} = \frac{-42}{-3}$$

$$y = 14$$

(f) Ibenhal thinks of a number. If she adds 19 to it and divides the sum by 5, she will get 8.

Sol: Let the number $= n$

$$\frac{n + 19}{5} = 8$$

$$n + 19 = 5 \times 8$$

$$n + 19 = 40$$

$$n = 40 - 19 = 21$$

(g) Anwar thinks of a number. If he takes away 7 from $\frac{5}{2}$ of the number, the result is 23.

Sol: Let the number $= x$

$$\frac{5x}{2} - 7 = 23$$

$$\frac{5x}{2} = 23 + 7$$

$$\frac{5x}{2} = 30$$

$$\frac{5x}{2} \times \frac{2}{5} = 30 \times \frac{2}{5}$$

$$x = 6 \times 2$$

$$x = 12$$

2. Solve the following:

(a) The teacher tells the class that the highest marks obtained by a student in her class is twice the lowest marks plus 7. The highest score is 87. What is the lowest score?

Sol: Let the lowest score $= x$

Highest marks $= 2x + 7$

Given the highest score=87

$$2x + 7 = 87$$

$$2x = 87 - 7$$

$$2x = 80$$

$$\frac{2x}{2} = \frac{80}{2}$$

$$x = 40$$

$\therefore$ The lowest score=40.

(b) In an isosceles triangle, the base angles are equal. The vertex angle is 40°. What are the base angles of the triangle? (Remember, the sum of three angles of a triangle is 180°).

Sol: Let the base angles $= b, b$

The vertex angle= 40°

The sum of three angles of a triangle is 180°

$$b + b + 40^0 = 180^0$$

$$2b + 40^0 = 180^0$$

$$2b = 180^0 - 40^0$$

$$2b = 140^0$$

$$\frac{2b}{2} = \frac{140^0}{2}$$

$$b = 70^0$$

$\therefore$ The base angles are $70^0, 70^0$.

(c) Sachin scored twice as many runs as Rahul. Together, their runs fell two short of a double century. How many runs did each one score?

Sol: Let Rahul's score $= x$

Sachin's score $= 2x$

From problem: $x + 2x = 200 - 2$

$3x = 198$

$\frac{3x}{3} = \frac{198}{3}$

$x = 66$

Rahul's score = 66 runs

Sachin's score = $2x = 132$ runs

3. Solve the following:

(i) Irfan says that he has 7 marbles more than five times the marbles Parmit has. Irfan has 37 marbles. How many marbles does Parmit have?

Sol: Let the number of marbles permit has=x

Number of marbles Irfan has=$5x + 7$

According to problem Irfan has 37 marbles.

$5x + 7 = 37$

$5x = 37 - 7$

$5x = 30$

$\frac{5x}{5} = \frac{30}{5}$

$x = 6$

$\therefore$ Parmit has 6 marbles.

(ii) Laxmi's father is 49 years old. He is 4 years older than three times Laxmi's age. What is Laxmi's age?

Sol: Let Laxmi's age=x *years*

From problem:$3x + 4 = 49$

$3x = 49 - 4$

$3x = 45$

$\frac{3x}{3} = \frac{45}{3}$

$x = 15$

$\therefore$ Laxmi's age=15 *years*

(iii) People of Sundargram planted trees in the village garden. Some of the trees were fruit trees. The number of non-fruit trees were two more than three times the number of fruit trees. What was the number of fruit trees planted if the number of non-fruit trees planted was 77?

Sol: Let the number of fruit trees planted= x

From problem: $3x + 2 = 77$

$3x = 77 - 2$

$3x = 75$

$$\frac{3x}{3} = \frac{75}{3}$$

$$x = 25$$

$\therefore$ The number of fruit trees planted=25

4. Solve the following riddle:

I am a number, Tell my identity!

Take me seven times over, And add a fifty!

To reach a triple century, You still need forty!

Sol: Let the number=x

From the problem: $7x + 50 + 40 = 300$

$7x + 90 = 300$

$7x = 300 - 90$

$7x = 210$

$$\frac{7x}{7} = \frac{210}{7}$$

$x = 30$

$\therefore$ The required number $= 30$